CONSULTANCY ON PROJECT MANAGEMENT AND MONITORING SYSTEMS

Grand River Informatics Inc.
PO Box 190
Fergus, ON N1M 2W8
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TABLE OF CONTENTS **Page**

Final Report

This report covers a consultancy undertaken at IDRC Headquarters between 1 January and 9 February 1996 by John Gordon of Grand River Informatics Inc. This report constitutes the final report called for in the contract.

A. Terms of Reference

The terms of reference stated in the contract are " to provide the Centre with an overview of its needs in project information management, the current and potential capacity of Radius to accommodate these needs, and a methodology to guide Centre users in considering the costs and benefits of keeping/maintaining information in Radius."

More specifically the consultant was required to:

1) Review with IDRC staff at all levels needs for data to:
   a) monitor and manage projects
   b) evaluate the programme and develop policy
   c) report to the board, funding organizations, government, etc.

2) Based on 1) above to review the data elements already being collected by IDRC in its different databases to see if they are suitable to meet the above requirements and to recommend changes in data collection practices/policies as relevant.

3) Critically examine the accuracy of the data presently in Radius and other databases to see to what extent it can be used to meet the requirements of 1).

4) In consultation with MIS and other staff to draw up a proposed work plan for IDRC to meet the needs identified in 1).

The contract was originally negotiated for 22 days, but was extended to 27 days to permit the consultant to prepare a number of exception reports on Radius

B. Activities

The consultant spent a total of five weeks in Ottawa (Jan 1 to Jan 12, 1996 and Jan. 22 to Feb. 9, 1996.)

During the first period the consultant interviewed a number of IDRC headquarters staff including the three vice-presidents, senior staff in each of the major groups, programme officers, PSU staff, research assistants and "super users". The interviews were carried out in the context of the recent re-organization of IDRC and focussed on 1) the usefulness and accuracy of Radius data

(and when relevant data in other IDRC systems), 2) the availability of reports and 3) the need for new reports.

The consultant also carried out a briefing for PUG (Promis Users Group) members on management issues surrounding database development and database systems. The briefing covered issues of file structure (flat file vs. relational), characteristics of relational systems (normalization and referential integrity), the difference between standalone, LAN and client-server systems and an introduction to the concept of warehousing.

The consultant accompanied two members of PUG and two Evaluation Unit staff to a demonstration of an integrated project management/monitoring/financial control system at the Canadian Public Health Association (CPHA).

The consultant also met regularly with a small steering committee set up by PUG.

In addition to the interviews, the consultant examined some of the data in Radius for accuracy and consistency (including comparisons to data from the financial system) and also developed a few sample management reports from Radius data.

At the end of the first two weeks the consultant prepared an interim report including a work plan for the final period of the consultancy.

As a result of problems in data consistency in Radius identified during the first visit, the consultant's second visit concentrated on activities necessary to initiate a clean up of the Radius system. The consultant developed 13 exception reports based mainly on key dates in the Radius system--these reports were submitted to a working group set up to correct the data in the Radius databases. Preliminary work was also done on developing reports to improve the assignment of projects to project officers and to examine the consistency of financial data in Radius. A number of follow-up interviews were carried out with staff to collect additional data.

Unfortunately the consultant was not able to contact regional office staff directly during the consultancy although they were sent copies of an interim report for comments.

C. Context

Although the consultancy was concerned mainly with IDRC's needs for computerized information systems for project management and monitoring (Radius), project management and monitoring needs have to be considered in the context of IDRC's overall information management and reporting requirements. In this context it is important to remember that IDRC is a knowledge-based/knowledge creating organization and as such should be expecting to achieve major productivity gains through the implementation of integrated information management systems. To avoid duplication of work and data, project management and monitoring systems are normally integrated closely with financial systems and are also required to be able to draw on and feed into

information systems for human resources, travel, project evaluation and records management. While information storage by organizational unit or function is often convenient, effective use of the data for management, monitoring and the preparation of reports to donors, government, etc. requires access to data from all of the organization's systems in an integrated way.

In order to put the findings, recommendations and proposed work plan into perspective it is necessary to review briefly the complement of IDRC's existing corporate computer systems and office automation software.

C1. IDRC Systems Environment (Corporate Systems)

IDRC has a nearly complete complement of the information systems that would be expected for an organization of its size. Unfortunately, although most of the systems are adequate in themselves, they are from a variety of developers, operate in different environments and use different database file structures, to the extent that data sharing between many of them is problematical. IDRC's systems run in three main environments--1) the HP3000 where most of the databases are in the Image file structure--2) as LAN systems, where most of the applications are in the Paradox 4 database file structure and 3) one client/server application --still at the testing stage--which runs under Gupta. Normally it is not too difficult to share data between systems running on the same platform, particularly if they are using the same database structure, but it is much more difficult to set up this data sharing between different platforms and different file structures. This inability to share data greatly reduces the usefulness of information held in any one system.

The main corporate systems and office automation software identified by the consultant are:

C1.1. Finance

HiFi--this is the main financial system. It is made up of a General Ledger, an Accounts Payable and a Payroll module (including a benefits module). These systems are compatible and do feed one another (although the process has not been completely satisfactory.) Accounting data from the regional offices can be loaded into these systems from spreadsheets or other database tables prepared in the field offices. This system has limited capacity to upload and down load data to and from other systems (using ASCII and other file formats.) The payroll system processes payments for Ottawa-based staff located in both Ottawa and the Regional offices, but it does not include locally recruited staff. The payroll system is not linked to the human resources software being used by IDRC. There are links between some of the data in HiFi and Promis(see below).

HiFi which is produced by a firm called HighLine, runs on the HP3000. It is apparently written in COBOL. The data is in the Image file structure and as such is relatively easy to link to Promis--reliable links to Radius (see below) are proving more difficult to establish.

(The firm which produces HiFi also had a compatible Human Resources application, but it was not considered to meet IDRC's requirements.)

C1.2. Human Resources

Hurmis--This is the main human resources system. This system is based on purchased software which was modified to meet IDRC's requirements. This system does not interact with the payroll system, does not include information on locally recruited staff nor does it have a leave management module. It is also not particularly useful in keeping personnel histories. The Hurmis application is written in Focus and runs on the LAN. At the moment it is not linked to any other systems, although staffing data is down loaded from time to time to Radius.

Organization Charts--Organization charts are prepared in a software called OrgPlus but the function is being moved to PowerPoint. OrgPlus and PowerPoint run on the LAN, but data from this application is not easily incorporated into any of the other systems.

Consultants/Contracts--Work has begun to develop a spreadsheet cum database on consulting contracts. This application is not yet operational, and given that it is being developed in a spreadsheet, should really be considered as a prototype for a database system to be developed eventually.

Human Resources does not have an application for recording and monitoring staff performance reports.

Human Resources has begun drawing up specifications to purchase a fully integrated Human Resources system to replace Hurmis and meet its other requirements. It is expected that an implementation plan will be available by September. This work is in progress and is being managed by a steering committee.

C1.3. Administration

TRIPS-- TRIPS is a travel system which permits trip planning, electronic travel authorizations, distribution of travel information and travel expense calculation. It runs on the LAN and can also run on a laptop, which permits travellers to keep travel expense records on the road. It tracks travel once a request for travel is entered, but it is not a travel planning system. It is a DOS based system using a proprietary database structure with no down load capability. It is reported to be a stable application and fairly easy to use.

TAPS/TIMS/AMAX-- This is a suite of three applications for automated procurement (TAPS), inventory management (TIPS) and asset management (AMAX). This system has been developed in Gupta's SQL Base and SQL Windows for the Federal Government.

There have been many problems with the system, and a production system has not yet been delivered. This is IDRC's only application developed in a client/server environment.

CRB--This is a room reservation system for meeting rooms developed by the same firm that developed TRIPS. This system uses the same technology as TRIPS.

C1.4. Project Management/Monitoring/Evaluation

IDRC is in the process of migrating the project management/monitoring and evaluation software from the HP3000 and the Image file structure to the LAN, with the eventual intention of conversion to a client/server environment.

Promis--Promis is a project management and monitoring application which runs on the HP3000 with data stored in the Image database file structure. It has links to HiFi and to EVIS (see below). Promis is in the process of being replaced by Radius which runs on the LAN. Promis data was down loaded to Radius about a year ago, but Promis has not yet been retired due to problems in Radius. In principle, data entry has been taking place in parallel in both systems. Even once Radius is fully operational, core Promis data will be maintained on the HP3000 to provide the necessary links between HiFi and EVIS. This data will be drawn from Radius and the residual system is referred to as HP-Radius.

Radius-- Radius is meant to be IDRC's main project monitoring and management system. Radius was designed to replace Promis but it is not yet fully operational. At the time of the report the data in both Radius and Promis were being updated in parallel. Radius contains key project dates, budgets and allotment information. The databases, which are in Paradox 4 file format, are accessed through several modules. These modules include Pipeline, AutoPS, Activity Monitoring, ALICCS, DTP, CENTRA (still under development), ARM, REX (still under development) and IDB. These modules are written for the Windows environment in a combination of Object Vision and Borland Turbo PASCAL, although they are being converted to Delphi, another Borland product. Radius receives limited data from Hurmis and HiFi. Radius runs on the headquarters LAN and is also running in the Regional Offices.

PCR-- A prototype application to permit the preparation and management of PCRs online is presently running on the LAN and in the field offices. This application was developed in Paradox 4 and the data is in the Paradox 4 database file structure. The PCR system draws information from Radius, but is not completely integrated into Radius. This application is being rewritten for Windows in Delphi and will be completely integrated into the Radius system.

EVIS-- EVIS contains summary data from evaluation reports. EVIS is essentially a data entry system with rudimentary search and reporting capabilities. Although EVIS contains some data from Radius, this data has all had to be re-entered directly into the system.

EVIS should in principle be part of the Radius system, but in its present incarnation is not able to be easily linked to other project management and monitoring applications. The EVIS reports do link to the Promis data base. EVIS is written in Cognos Powerhouse and runs on the HP3000. The database is in the Image file format.

C1.5. Research Information Management Systems

BIBLIOL--Bibliol is a MINISIS based bibliographic system, which would not normally need to be linked to other IDRC applications.

IDRIS--IDRIS is a MINISIS based system which makes information from Radius available to users outside IDRC.

FROLIC-- FROLIC is a records management system developed by Datafile. It is used mainly to register IDRC's files and includes references to all paper-based PCRs. FROLIC runs on the LAN, but its database structure is proprietary and there are no links between Frolic and any other system.

At present there is no organization-wide computer-based system for recording and tracking mail or E-mail, although an E-mail tracking system is being used in the President's office.

EDMS project--This project is presently studying the potential for a major investment in text management systems. The scope of the proposed system as presently envisaged would 1) replace the functionality of Frolic, and 2) provide a mail and E-mail recording and tracking system.

Document Scanning-- This project would provide for the scanning of 1,000 key documents relating to projects and make them available within the Centre and to external users.

C1.6. Scientific Systems

FOODLINK--This software is being developed by MIS for the Foodlink PI. When complete the software will permit users to identify producers of selected agricultural products in a variety of countries. It is being designed, among other reasons, to assist Canadian importers to identify suitable sources of agricultural products abroad. The system is being developed by MIS in Delphi on a Paradox 4 data base. It is linked to Radius.

C1.7. Office Automation

Word Processing-- MIS has just made the WordPerfect 6.1 word processor available to all users on the LAN. .

Spreadsheet--MIS has just made the Quattro 6 spreadsheet available to all users on the LAN.

Database Software-- Some users have access to Paradox 4, a database management system that runs under DOS, but the organization has not yet standardized on any of the more modern Windows Based database systems such as Access or Paradox 7 for Windows.

Reporting Software-- Crystal Reports, a Windows based application for report preparation, is available on the LAN. Crystal Reports is a useful tool for preparing "canned reports" which will be run on a regular basis. Crystal Reports in not particularly useful for developing ad hoc reports which involve considerable manipulation of the data.

C2. Reporting Requirements--

In addition to looking at existing systems, it is important to examine the organization's present and future reporting needs. The identification of needed reports is an important input into the specifications for further systems procurement or development. As part of the interview process, staff were asked about reporting needs.

Many respondents were not in a position to discuss reporting needs, and only one member of senior management prepared a detailed "wish list" of reporting requirements. Most of those interviewed gave highest priority to making IDRC's systems compatible with the new structure of the Research Branch. The highest priority was to be able to produce basic management reports by Programme Initiative (PI) and on PI's revenue generation plans and activities.

PI--Areas specifically mentioned were the purpose of the PI, its components (including pipeline), the leadership and membership of the teams, allocation of funds, revenue generation targets and sources, revenue generation (actual), partners (in implementation and in funding), principal achievements/activities during last reporting period, and planned principal achievements/activities.

Management and monitoring of the programme under IDRC's new structure will be very difficult until it is possible to provide information based on the new organization and functions for basic reports such as 1) lists of active projects by PO responsible, 2) lists of projects requiring PCRs, 3) lists of projects with reports overdue, 4) lists of projects requiring monitoring visits, etc.

The one senior staff member who prepared a "wish list" of reports included the following:

Consultants-- This would include information on which consulting firms IDRC is using, for what purposes, at what cost, whether a contract was competitive or sole-source and the consultant's history with IDRC including the quality of its performance.

Outside Revenue--Detailed information on outside revenue received by IDRC including information on contract research, co-funding, royalties and sales. Information required would include the amount, the sources, the related activities and projects, variance (budget vs. actual), and negotiations in progress. This information would be requested quarterly.

Parallel Funding-- Information by project, by cash vs. in kind, and by sources and partners. This information would be required semi-annually or annually.

Programme Budget-- This report would include allocations (by PI and Sector), commitments, revenue generation targets (by PI and Sector), schedule (timing and commitment), RSAs, disbursement and disbursement schedule. (Quarterly)

Travel-- This report would include information on travel plans, budgets, plans vs. actuals, balances. (Quarterly)

Personnel Data-- Names and position of staff (including locally recruited), contract type, termination date, service with IDRC, responsibility centre, grade, academic and professional qualifications, field experience and languages.

C3. General Observations

The key issue on both management needs and reporting was the need to adapt the existing systems to reflect IDRC's new structure and activities. The changes in structure and function on the research side of the organization are particularly important. The two most important areas requiring system modifications are the need to be able to report on project activities and expenditure by Programme Initiative and the need to track information on collaborative fund raising. Before these functions can be integrated into the various systems it will be necessary to work out the specific items of information that are required and the business rules that apply to the system.

Several of the reporting requirements discussed--reports on consultants hired, their status, satisfaction with their work or reports on staff including education and career history-- either required information which is not available on IDRC's databases or the co-ordination of information from two or more systems which are not easily able to exchange data. The need for reporting on employment equity to the Government appears to be well in hand. However, none of the staff raised the likely need for IDRC to be able to report to government in the context of

Results Based Management which is becoming a requirement with CIDA and is also of interest to the Auditor General.

In the context of IDRC's restructuring and downsizing, almost no mention was made of IDRC's inevitable growing reliance on information systems brought about not only by the decrease in staff numbers, but the new structure in the Research Branch which focuses on collaborative programme work, but concentrates responsibility for administration at the most senior levels.

Given that a significant redesign of some of the table structures will be required to incorporate management data required by the new corporate structures and functions and given MIS' already heavy workload, it will probably take several months to adapt existing information systems to provide information in the formats necessary to effectively manage Programme Initiatives and programme fund raising under the new structure.

C3.1. Corporate Systems

Issues concerning Radius and other project management/monitoring tools will be looked at in more detail below, but it is important to first have an overview of IDRC's software suite. IDRC has identified and implemented computer systems to meet most of its administrative and programming needs. While the number and variety of systems that IDRC has running is impressive, and while each system probably meets about 60 to 80 percent of the needs of the organizational unit running it, a number of problems are evident. There are three main concerns: 1) much of the software operates on proprietary or at least old database structures and does not communicate easily with the other applications, 2) the software is developed in a number of different computer "languages" which imposes a very heavy burden on the MIS department which cannot hope to keep up-to-date in all of the technologies in use, and 3) there are important gaps in both the type of information kept and the coverage of some of the information--for example it would be extremely difficult to develop a good historical profile of IDRC staff--salary data is kept in one application, basic HR data is kept in another which cannot communicate with the first, and no data is kept on locally recruited staff,

All of the above systems are due, or nearly due, for upgrading to more modern technology. Both Human Resources and Research Information Management Systems have begun drawing up specifications for new systems, and it is recognized that the project management software Radius must be moved to a more modern technology, although it is not yet fully implemented in its present incarnation.

C3.2. Office Automation

With respect to the office automation software, WordPerfect, QuattroPro 6 and Crystal Reports are modern software tools and integrate with each other reasonably well. Word processing, spreadsheet development and report writing probably make up about 90 percent of the work done on non-corporate systems, and these three products are suitable. However, IDRC does lack

software tools to access and analyse data. In a knowledge based/knowledge creating organization like IDRC it would be normal for users to have access to a good database management application such as Access or Paradox as well as to statistical analysis software such as SPSS. No suitable database development package is available, although users can have access to Paradox 4--which is a DOS based system and not particularly user-friendly compared to some of the Windows based database management systems now on the market. SPSS is available in the Centre, but not on the LAN because there has in fact been little or no demand for it.

C3.3. Reports

The requests for reports concentrated on the need to integrate the necessary data to support the new IDRC structure into the various corporate applications. This is a very high priority. The "wish list" is also important because it highlights the data gaps in the existing systems--many of the reports on the wish list could not be prepared from existing systems without a great deal of manual work.

Also important are the areas which were not identified as requiring reports, specifically the issue of Results Based Management (RBM) and reporting for day-to-day operations. These issues were not addressed by those being interviewed, however both are important in the context of the future of IDRC's management information systems.

RBM-- Both the Auditor General and CIDA are putting a high priority on reporting based on Results Based Management principles. A working definition of RBM is not easy get--but it is the management "flavour of the month" and as such IDRC must be seen to be able to provide information in the required formats. RBM is nothing particularly new and is a direct descendent of Project and Performance Budgeting among others. The core ideas are not bad and essentially involve associating measurable objectives, costs and outputs within projects to provide measurable performance and cost-effectiveness indicators. In principle these performance indicators can be tracked through time and used as an input for short and longer term management decisions.

Management Reports--One of the problems with maintaining data integrity in Radius is that the system has never really been used as a management tool either at the programme officer or senior manager level. Ideally, at the programme officer level, the system would be used to manage online. However, for a number of reasons, the system appears to be being used more like some of the earlier mainframe systems--the programme officer gets a printout--corrections are made--an assistant does the data entry and prints a new report--etc. Data is stored in the system and the system reflects management actions rather than initiating them. In addition to being inefficient, this use of the system more as a store for information than a management tool, reduces a lot of the pressure for the data in the system to be correct. Moreover, senior managers are also not relying on Radius for management information--and reports are still generated from Promis when management information is needed. This lack of pressure on the system generates a chicken-egg

situation--the system isn't used because the data isn't accurate, but the data isn't accurate because the system isn't used.

To become a useful management tool Radius must be able to generate a minimum number of management reports. Three basic management reports are proposed:

- A workload report to be sent to senior managers. This report would be sorted by Programme officer showing their workload (number of projects/RSAs in different categories) including pipeline Projects/RSAs, active projects/RSAs (not legally closed), projects requiring PCRs and projects/RSAs requiring closure.

- A milestone report to be sent to senior managers, showing Project/RSA actions which are due or overdue. This would include projects which are overdue or coming due during the next month (or quarter) for legal closure, PCR preparation or administrative completion.

- A milestone report for each programme officer with the same information as in the report above but also including milestone information on other activities such as contract signings, payments, reports, etc.

Initially these reports will serve more for the correction of data than for management, but as the data is cleaned up, the reports will become increasingly useful management tools. The reports described above will be essential to support the Research Department restructuring and downsizing. A level of middle management has been removed at the same time as the responsibilities of individual officers are associated with a number of PIs rather than a definable administrative unit--this means that the buck doesn't stop until it reaches the top of the structure. In these circumstances the senior research management will need better tools to manage staff work load and project progress.

C3.4 Capacity of MIS

The consultant's terms of reference did not include a review of the capacity of the MIS shop. However, based on observations during a number of visits, the present staffing and structure of MIS does not appear adequate to deal with all of the demands being made of it. The MIS shop is relatively small and it must 1) deal with day-to-day problems on the LAN and with microcomputer hardware and software (granted that maintenance functions have been contracted out), 2) deal with corporate software that is operating on different platforms and developed in a variety of computer languages, 3) develop internally and maintain the Radius and Foodlink systems (including the conversion from Promis to Radius), 4) deal with all the systems changes that will be required to adequately service the recent management and function changes within IDRC and 5) develop and implement a longer term strategy for moving IDRC into a more modern suite of corporate computer applications. As a result of the multiple demands, the bulk of the MIS department appears to be in a constant "fire-fighting" mode--barely able to keep up with the day-

to-day pressures and not able to undertake medium or long term activities necessary to provide the technology IDRC will need to operate efficiently. Given that this analysis is based on observations not backed up by the data for a thorough analysis, no recommendations will be made in this report other than to highlight this systemic concern and to suggest that IDRC needs a thorough review of the MIS function in the context of the newly reorganized IDRC.

D. The Radius Application

The general issues examined above are important to IDRC in the overall context of the development of management information systems including Radius, however, the main emphasis in the terms of reference is to review the implementation of the Radius system with a view to designing a work plan to make the system operational.

During interviews the consultant found that users invariably complained about Radius. Complaints concerned the amount of time it has taken to get the system operational, inaccuracy and corruption of data in the system, the slowness of the system, and the "unfriendliness" of the interface. Users were often very critical of the role played by MIS in the development of the Radius system. The consultant's terms of reference covered only the question of data availability and reliability and the short duration of the consultancy did not permit a full study of the system's speed, interface or ease-of-use.

The user community reacts quite negatively to the Radius system. The system has rightly or wrongly become a measure of the MIS department's ability to develop and implement systems. Understandably, MIS has become somewhat defensive. The result is a fairly high level of frustration on both sides. It is not useful at this stage to go into the history of Radius to assess responsibility for the problems--but if MIS is to regain the trust of the users it is imperative that the system be made operational. Another important incentive to getting Radius operational as quickly as possible is the high cost in staff time of entering parallel data into both Promis and Radius.

The consultant concentrated on four main issues with respect to Radius: 1) data accuracy and completeness, 2) data requirements not foreseen when Radius was developed, 3) linkages between Radius and other systems and 4) more general issues that affect both Radius and management information systems generally. Of the four, the key to making Radius operational in its present form is data accuracy and completeness, however, the other issues are important if Radius is ever to become a truly useful project management system.

D1. Data Accuracy

The users interviewed obviously had no faith in the reliability of data in Radius. Radius data was invariably considered less reliable and less timely than data in Promis. Although the systems are

being run in parallel, important management reports are still generated from Promis because the Radius data is suspect.

The consultant's testing of Radius data confirmed the view of the users that certain key data is unreliable. For example, the consultant examined six indicators of project status in Radius--Project administrative status, project administrative closure date, project legal status, project completion date, pipeline status and project approval date. These indicators indicated project status consistently (not necessarily correctly) in about 70 percent of cases (in 30 per cent of cases the indicators were inconsistent.) A comparison of these indicators to data from the PCR system and the financial systems raised doubts about the accuracy of the indicators even when they were consistent. At the same time, significant corruption of data was found in a number of date and financial fields. In some date fields up to several hundred records were irrational.

Given that the basic data in Radius was loaded from Promis, users of the systems blamed the data problems in Radius on the data conversion process. The consultant carried out a number of exception reports in Radius, based mainly on the accuracy of key dates in the system, and found a very high proportion of internal inconsistencies. However, when random checks of these inconsistencies were made in Promis, the same errors were found and the consultant has concluded that the data conversion from Promis to Radius was consistent, at least insofar as key dates were concerned. (To give an idea of the magnitude of the problem, of the total 8,000 or so records in Radius, about 1,800 have date inconsistencies with respect to approval and closure. When data on project legal closures in Radius was compared to data in HiFi some 250 inconsistencies between records in the two systems were identified.)

In the majority of cases, the inconsistencies and problems surrounding dates reflect management problems. In many cases projects have not been properly closed in either Radius or Promis and in other cases projects have been closed with information on key dates missing. These are management and data entry problems, although they have been compounded by inadequate business rules which would have exerted more control over the data which could be entered--mainly in Promis--but also to a degree in Radius. The two systems also seem to lack adequate internal checking to minimize improper data entry. The large number of unclosed projects also suggests that neither the Promis nor Radius systems have been regularly used by all divisions to manage their projects, otherwise the enormous backlog of unclosed projects would have become evident some time ago. Some of the data inconsistencies have been caused by failure of the users to actually update both systems in parallel since the data conversion took place early in 1995. It is possible that these problems are more evident in Radius than in Promis because the databases in Radius are project oriented rather recipient oriented as in Promis.

There is also evidence of data corruption in Radius. In some modules, Radius has been generating phantom dates--often for years in the 32nd millennium.

In addition to the date problems, many still active projects (at least still shown as active in Radius) are supposedly being managed by IDRC staff who left the organization years ago-- good

reporting in Promis and Radius would have made these problems evident and would have led to them being corrected.

An additional problem in Radius, which the consultant has not had a full opportunity to explore, is inconsistencies in financial data--particularly data kept on project grants. A preliminary examination has shown that in some cases Radius is generating phantom grant amounts (-$2 billion in some cases). Another problem is an inconsistency between project initial grant amounts and total grant amounts in the project table of Radius--these are fields are generated by the system. For approved projects, both fields should have data in them, but in many cases only one of the fields has been filled. It will be necessary at some stage to run a routine to regenerate these two fields before their accuracy can be adequately tested. A further complication arises because the key field generating some of the amounts is a generated field itself, rather than the date which is the main marker in the system--this opens up a potential for additional problems should the generated indicator become inconsistent.

Many of the data problems observed relate to projects managed by the Regional Offices. The lack of a suitable data synchronization between the offices and Ottawa has exacerbated an already difficult problem. MIS now appears to have the synchronization problem in hand and a re-examination of Radius later in March may show that some of the data inconsistencies have been corrected through the inclusion of new data from the regional offices.

The PCR system also contains some doubtful data. In this case it is apparently due to users testing the system in the "live" application. A number of PCRs have been begun but never completed--and it is suspected that many of these are phantoms--the result of someone practising. The consultant has given a report on data in each of the database tables in the PCR system to the Evaluation Unit and assisted the unit in inserting missing key dates and closure indicators into the system. There is also an inconsistency with respect to PCRs in the Radius Project table--there is an indicator showing whether or not a PCR is required--this is a calculated field and somehow the indicators have become inconsistent--a yes indicator can be shown by either "Yes" or "Y" while a No indicator is either "No" or "N". One of the two sets of indicators should be selected and all the indicators modified to be consistent. (This may seem like a small thing, but the incompatibility of the indicators can raise problems during the preparation of queries or reports.)

D2. Additional Data Requirements

There are a number of fields which could be usefully added to the Radius database structure to help meet needs defined in the list of desirable reports above or to include information that is otherwise missing for reports or analysis.

The reorganization of IDRC and the restructuring of its finances has created a need for reports based on information which is not kept in Radius. The main area where data is missing is for Project Initiatives (PI) and revenue generation. The programme budget and interdisciplinary and

participatory projects were also identified as subjects for which improved data collection was desirable.

Some of the missing data is readily available, for example, for reasons which are not clear, data on PCR completion which is available in Promis has not been included in Radius. This information is necessary to provide an effective linkage between Radius and the PCR system and among other things helps to identify projects which should be closed. A table of PCRs by date of submission would be easy to include as part of the PCR system. It would also be a simple matter to indicate whether the PCR is available on line or only in paper format.

One of the basic problems with Radius is that it appears to have been designed to fit IDRC's structure as it existed at one specific time. This might have seemed logical when it was done, however, organizations are prone to change--every organization goes through periods of centralization, decentralization--grouping by geographic areas--grouping by subject matter, etc. Information systems which are designed to mirror a specific organization structure become increasingly unwieldy as they are modified to deal with inevitable organizational change. For example, there is no long-term coherent basis for classifying projects in Radius. Projects can be classified by theme or keyword, and in the future they will be classified by PI. At one stage projects could be classified roughly by sector when the IDRC's research groups were sector based. However, given that classification has tended to be based on organizational units or clusters, there is no one indicator in the Radius system which allows projects to be classified through time in a consistent way by sector or sub-sector. There appears to be little internal demand in IDRC for projects to be classified in this manner, however, this type of classification is important for maintaining long-term consistency of analysis of the programme. It could also be an important element in carrying out Results Based Management analysis and comparison of IDRC's work with that of other organizations. There are already suitable sets of sector and subsector codes developed by the UN, the World Bank, OECD, etc. and IDRC will not need to create its own set of codes. The classification of old projects however, could be somewhat time consuming.

Results Based Management requires the creation of a set of baseline objectives for each project. These must be measurable performance indicators, and further work will be required to identify them and devise ways of entering data on them into the database.

There are also a number of fields in the Radius system which can probably be eliminated--there are fields where no one has even bothered to enter any information. However, before this is done an examination of the basic project management business rules will have to be undertaken. The consultant's impression is that several of the fields could be dispensed with.

D3. Linkages

Project management and monitoring require using data which is stored in other systems including HiFi and Hurmis. Unfortunately each of these databases uses different technology and data from

one application is not easily married to data from the other application. HiFi can't easily talk to Radius and Radius can't talk to Hurmis, etc. etc. This inability to easily share data between different applications greatly reduces the value of the data for management and reporting. A more effective link between Radius data and data from the financial systems is a priority.

A short term solution would be to build a small data repository or "warehouse" where key data from each of the organization's main databases--project management, finance and human resources, could be kept in a simplified format to ease the problem of reporting--particularly when information from more than one system is required. This warehouse would not overcome problems of missing data, but it would greatly facilitate the preparation of reports which are required to link information from several systems.

D4. Other Radius Issues

There are a number of other issues which arise in the context of the problems in Radius. Some of these are also more systemic concerns in IDRC, but they will be examined specifically with respect to Radius. These issues include Access to Data for Ad Hoc Reporting, Responsibility for Data, and Training.

D4.1. Access to Data for Ad Hoc Reporting-- One of the problems which has led to the inability of users to identify and correct problems in Radius is that they do not have access to the data except directly through the system or by using the reports prepared by MIS. None of the non-MIS staff interviewed is sufficiently familiar with either the software available for ad hoc reporting or the Radius database itself to develop their own reports. As a result, all reporting on Radius is limited to the standard reports on the system. It is essential that users are able to "play with" the data (read only), to browse through it and query it in different ways in order to identify anomalies. For example, one of the inconsistencies in Radius are missing dates which should normally be appearing in a sequence--unless it is possible to query the database and view the sequence in isolation, it is difficult to identify and correct the erroneous data.

To overcome this problem, users would have to be trained in the basic principles of database design to help them to understand the structure of the data underlying the Radius system as well as in the use of software tools which give easy access to the databases.

The software tools are a problem, because at the moment IDRC does not have a suitable ad hoc reporting tool for its systems. The closest thing to an analytical tool is Quattro Pro 6 which is available to all users. This software has three modules--a spreadsheet, a query-by-example tool and a modelling tool which can be used to do cross tabulations. These modules could be used for carrying out sophisticated analysis of the Radius database, however Quattro 6 is not easily automated and while its crosstab and other data analysis functions are powerful, they require considerable manual manipulation to turn out presentable reports. Crystal Reports, the reporting tool used by MIS to develop reports for the Radius system, is not really adequate as an ad hoc reporting tool. End users would normally use a fully fledged database system like Access or

Paradox to develop ad hoc reports. These applications have good interactive query tools as well as good tools for cross tabulation--very important for delving into data to discover errors. They also have simple report writers which would enable users to mock-up reports based on queries to guide MIS in its development of more static reports for the system.

D4.2. Responsibility for data-- Some of the data problems in Radius/Promis are due to software or other systems problems, however the bulk of the work in cleaning up the system is due to improper data entry or more commonly, a failure on the part of the staff responsible to ensure that their projects are properly managed on the system. While PUG and the Data Control Committee are concerned about data reliability and have carried out tests on data, there seems to be no one responsible for ensuring that data in the organization as a whole is accurate. This type of problem is typical of situations where there is no one person responsible for the accuracy of the data. For example, for IDRC's financial systems it is clear that the Office of the Treasurer is responsible for ensuring that data in the system is correct, and during my interviews I heard no complaints about the accuracy and timeliness of the information in the financial systems. However, for Promis and Radius the centre of responsibility ("the buck stops here") for data completeness and accuracy as well as for identifying necessary links with other corporate systems is not defined. Many users seem to think that MIS is responsible for ensuring that data is correct. However, MIS can only be responsible for ensuring that the system runs well, that business rules are implemented and that as much as possible controls are built into the data entry system to minimize inaccurate data entry. MIS has no control over data entry.

Another problem, and this is particularly true of Radius, is that the system does not appear to be particularly friendly to use. The consultant heard many complaints about the slowness of Radius and a tendency to "crash" or "freeze up." These latter problems have more to do with the relatively old technology being used (Object Vision and the Paradox 4 database) than the design of the system itself.

IDRC must ensure that the responsibility for data accuracy in Radius and for linkages between Radius and other systems is clearly defined. This would normally be done by appointing an Information Manager or a Chief Information Officer (given IDRC's size this need not be a full-time job) who has the clout to ensure that data is maintained. The development of reports from Radius to be used by senior managers to actually manage the programme would also put pressure on the users to ensure that the data is accurate and timely. It is very hard to ensure that data is both timely and accurate in a system that is not being actively used to manage. It is clear that IDRC has never used Radius as a project management tool, otherwise the data would not be in the deplorable condition it is in.

D4.3. Senior Management Training--The reaction to the briefing on database management given by the consultant suggests that there is a need to train senior staff and managers in the general principles and implications of database development to help them better understand the impact of management proposals being made. The present reorganization is a case in point, major decisions on organization structure and functions have been taken and implemented, apparently without

adequate attention having been paid to the implications for the organization's corporate computer systems, which are not able to provide management information in the formats needed to support the reorganized management.

D4.4. Usability of Radius--The consultant did not test the Radius system himself, but based on the many complaints received, Radius has a "usability" problem. The entering of data into a database system is time consuming and will not be done unless there is a visible payback. One of the paybacks would be a system which permits IDRC's programme to be effectively managed. In addition to speed, the system should have a non-confusing interface and should permit much of the management to be done online. IDRC might want to examine a system in use by CPHA as one possible model to be used in the design of the "new" Radius.

The CPHA monitoring system, which has already been demonstrated to a small group of IDRC staff, is designed around milestones. The system highlights milestones coming due as well as those which are overdue. It produces much of the routine correspondence necessary for managing and monitoring the projects and has effectively incorporated the financial management and monitoring with other aspects of project management and monitoring. It permits almost all of the necessary management functions to be carried out online in response to project information presented online. Project officers are able to down load all relevant project information onto laptops for field trips and upload any modifications they have made during the trip onto the system on their return. The reporting at the programme officer level has been particularly well developed, but more general management reports are not as well developed. This system is user driven--the director of the programme did the original design himself with the aid of consultants. The main complaint to date with the software has been the heavy commitment necessary to keep the data relevant.

All of these lessons are relevant to IDRC's ongoing development of the Radius system.

D4.5. Technology strategy-- Given that consideration is being given to replacing many of IDRC's existing systems some basic steps should be taken to avoid the problem of proliferation of software environments that exists with its present systems. Before any decision is made on replacement of major systems IDRC needs to develop a long-term strategy on hardware platforms and on operating systems, server software and client development software. This strategy should also provide individual units within the organization with the necessary framework to ensure that decisions on hardware and software meet corporate as well as unit objectives.

For example, IDRC will probably decide to migrate many of its corporate systems to a client server environment. This will involve decisions on a number of issues including the selection of suitable hardware and software standards for servers, operating systems, and LAN operations. These decisions should be taken before any major decisions on converting of individual applications is made. Another issue will be whether application selection is made with a view to meeting the precise needs of the individual units or of maximizing the impact on the corporation as a whole. A larger organization such as the World Bank has the financial and systems

development resources to make decisions on individual pieces of software on a "best of breed" basis and then invest in making the various pieces of software selected work together. IDRC does not have these resources and may find that in terms of overall cost and functionality its interests are best served by choosing a solution from a company which provides an integrated approach (SAP, Oracle or PeopleSoft would be examples) where each of the modules may fall somewhat short of the "best of breed", but where the advantages of having a common client/server solution with integrated access to data offsets the disadvantages.

E. Issues and Strategy

E1. Issues

The above discussion has brought to the fore a number of issues which have to be taken into account when developing a strategy to better utilize IDRC's databases. The more important issues are outlined below and grouped into those which are of a more general nature and those which are more Radius specific.:

General Issues

1) IDRC has had its resources cut--staff numbers have been reduced, but at the same time pressure to report more fully, particularly to external donors will increase. (If the external fund raising is successful this pressure will likely increase even more and the different donors will undoubtedly have different reporting requirements.)

2) Someone in IDRC must have final responsibility and authority for ensuring that data is relevant, accurate and consistent.

3) Restructured and downsized organizations are much more reliant on effective information systems than their more hierarchical and more heavily staffed predecessors.

4) Reporting requirements to outside organizations, including Government, were not specifically defined. However, indications are that IDRC will increasingly be asked for data to justify its programme and expenditure. The Government is putting particular emphasis on "Results Based Management". At present Radius does not contain the kind of performance indicators which are normally required to prepare reports based on "Results Based Management" principles.

5) The MIS department appears to be seriously understaffed given the information system needs of the organization. The present restructuring appears to have been undertaken without a full realization of the need for modification and updating of the organization's information systems or of the resources that will be required to build an efficient information system.

Radius Specific Issues

1) The data in Radius is suspect and once the data has been corrected the users will require a certain amount of convincing before they will willingly use the system. In addition, there is a significant time investment required to update the information in Radius.

2) The use of Radius and Promis in parallel is a drain on scarce resources.

3) Data collection and data entry has a cost--a system which imposes too much of a burden relative to its usefulness as a management tool will soon get neglected.

4) Users and managers will require tools and training to enable them to prepare their own ad hoc reports on Radius and hopefully other databases--this will be particularly useful for the Data Control Committee to review the consistency of data in and between databases.

5) Unless project officers and senior management find Radius to be an effective management tool the information in it will become rapidly out of date.

6) Radius as it exists was based on the previous organization structure--the database itself will require some revising to make it relevant to the present structure.

7) Under the new structure it is particularly important that data in Radius from regional offices be up-to-date and easily accessible both to Headquarters and to the Regional Offices.

8) The revised structure of the Research Branch has concentrated overall responsibility for programming and planning staff workloads at the senior management level. A number of reports including workload reports, status of milestones, etc. will have to be available from Radius to help management ensure that workloads are equitable and that project milestones are being met.

E2. Strategy

Taking the basic issues outlined above, a basic strategy for IDRC is outlined below. This strategy would permit the organization to deal effectively with many of the issues surrounding its project management and monitoring needs.

General Strategy

1) Someone--preferably a senior person on the Client Services or Research side--should be given the authority/responsibility for ensuring that the organization's databases are relevant and current (an Information Manager or Chief Information Officer). This person

should be the driving force behind any strategy adopted. This person should meet regularly with PUG and the data control committee to ensure that their concerns are transmitted to senior management.

2) Training is essential. This should be combined with the making of data more accessible. Users at IDRC are unfamiliar with the basic tools for querying and analysing databases and many managers do not seem to be aware of the implications of decisions that they are taking on information management. Training will have to be carried out at at least three levels--a) hands-on training in applications, b) report writing and analysis and c) information systems and management. In addition, the Radius database is relational and highly normalized--not conducive to easy reporting. Some form of warehousing (creating a flat file of information in Radius) should be examined. Suitable tools will also have to be acquired. A dedicated Executive Information System (something like Forest and Trees) might be appropriate. Standard report writers such as Crystal Reports and Report Smith are excellent for preparing standard administrative reports but so far do not have the analytical tools necessary for sophisticated ad hoc reporting.

3) Once Radius is functioning effectively, more attention must be paid to getting all of the organization's databases into a compatible technology, or at the very least into technologies that permit the construction of a data warehouse which ties together data from all of the organization's databases. This suggests a move to client/server technology, at a very minimum for the development of the warehouse.

4) The problem of keeping all of the Radius databases up-to-date will only be solved when the regional offices have online access to the databases--at least for uploading and down loading. This can entail heavy communications costs and might not be feasible immediately, but IDRC may wish to investigate negotiating the purchase of services from SITA (they service airlines and travel agents world wide) who have perhaps the most extensive data communications network available or a similar provider. Several UN organizations are now using SITA for communications and data transfer.

5) The above activities will have implications for IDRC's overall information management structure. At present IDRC's expertise is almost entirely in-house and management and development are taking place with staff resources. This puts particularly heavy demands on staff when major changes have to be made--this is true right at the moment when IDRC is having to change its systems to cope with organizational change, but when it should also be looking at the consolidation of its various systems into a more modern and compatible technology. A staff structure which relies on staff for administration, design and standards and on out-sourcing for development and maintenance is often more cost effective in these situations.

Radius Strategy

1) The first step must be to get Radius data to the same level of accuracy as Promis and to close the Promis system. Only when the users have to rely on Radius will it become a functioning system. The first step is already in process--a blitz is being carried out to ensure that all closed projects are reflected in the system and that projects that for some reason have fallen between the cracks are closed. One technique to support this blitz would be to develop workload and milestone reports for project officers and managers--this will permit both rapid updating of the data and the familiarization of managers with the type of report that can be prepared in the system.

2) While the Radius database is being cleaned up, work must begin on the restructuring of Radius to take account of the recent reorganization and revised management needs. This will involve a close working relationship between an Information Manager, senior management, PUG and MIS. Until the information systems are gathering the information necessary to manage in the new structure and with the new mandates on funding, IDRC managers will be flying blind or significant staff resources will have to be devoted to manual data collection and analysis.

3) Before Radius can be made fully operational the incomplete modules must be completed.

4) The PCR system will soon be integrated into Radius. IDRC should consider integrating the EVIS system into Radius as well.

F. Work Programme

IDRC is in a situation where because of its downsizing and reorganization it will become increasingly reliant on its information systems to manage both its programme and its administration. This change in organization size and structure has come at a difficult time--just when IDRC was going to have to rethink its entire information system structure. The organization has a complete suite of systems but the technology is old and they do not meet the organization's needs. In at least one main system the data is badly in need of correction and updating. At the same time, the MIS staff is too small to 1) deal with the many technologies represented by the existing systems, 2) convert the existing systems to deal with the needs of the restructured organization, 3) correct and update the Radius system and 4) develop and implement a new technology strategy.

The recommended work programme takes into account the relative scarcity of MIS resources, the needs imposed by the downsizing and reorganization and the need to at least maintain services at present levels.

F1. Steps Underway

Based on reports from PUG, the data control committee and the interim report of this consultancy, the Vice-President (Resources) has allocated funds for the cleaning up of data in the Radius database. Four staff have been assigned to the task and exception reports to assist in data correction have been provided by MIS and by the consultant. The cleaning up of the Radius data is of the highest priority, not only because the system is important to the management of IDRC, but also because Radius is now viewed by the users as a test of whether MIS can get systems up and running. At the moment, the failure to fully implement Radius has been perceived by the users as a major failure by MIS. MIS must share some of the blame, but the general lack of organization and lack of the assigning of a clear cut responsibility on the user side has contributed to a large degree in the slow implementation of Radius.

The first requirement is to get the Radius system operational and the Promis system closed down. There are a number of reasons for this priority: 1) IDRC cannot afford to be entering data into the two systems simultaneously, 2) the users are getting extremely frustrated with the system which has now become a test of MIS' credibility and 3) until the users have to rely on Radius alone, there is little incentive to maintain data and to improve the system to more adequately meet project management needs.

The following steps need to be taken urgently--IDRC should have a target date of 31 May, 1996 for the effective closure of Promis (HP-Radius would be maintained):

- Correct the key data in Radius, including the dates and financial data (this work has already begun).

- Ensure that all projects in Promis are in Radius (this work has already begun).

- Get the two incomplete Radius modules operational (this work has already begun).

- Develop a series of exception reports for testing the data in Radius. Initially this would concentrate on key dates and financial data, but would be expanded as the quality of the key data is improved. The clean up of the system will have to be an ongoing process, although the work involved should decrease as the system becomes operational. (Some work has begun on this activity.)

- Develop a series of management reports which are distributed regularly to management to ensure that management 1) is aware of data problems and 2) begins to rely on the system. These reports should include the following reports 1) workload by staff member, 2) key milestones (approval, legal completion, administrative closure) overdue and coming due in the next month (for managers) and 3) operational milestones overdue and coming

due in the next month (for project officers). Financial and other reports can be added once the milestone information has reached an acceptable level of accuracy. (It is best not to flood management with unusable reports.)

- Review the Radius business rules to ensure that only necessary data is being kept and that calculations in the system are correct.(Some work has begun on this activity.)

- Select ad hoc reporting tools to allow users to query Radius databases directly and train the users in basic relational database structure and querying. If possible the reports should be developed on a read only databases (data warehouse--see below).

- Include in Radius the fields necessary to manage projects under the reorganization of the Research Department and to implement Results Based Management--this would include data on PIs, on revenue generation and on measurable performance indicators..

- Integrate the PCR system completely into Radius including a table which records all PCRs which have been completed or are in preparation. (This work is in progress).

- Integrate the EVIS system into Radius (This work is being discussed.)

F2. Intermediate term requirements

- One of the problems of implementing systems in IDRC is that a significant proportion of the management and professional staff are not fully aware of the systems implications of management decisions, nor are they aware of the potential offered by modern software to a knowledge based organization--a training programme for managers and professionals to keep them abreast of these issues is important.

- Various units in IDRC are beginning to prepare system specification studies for the replacement of existing systems--before this exercise proceeds too far, it is important for IDRC to develop a long term client/server strategy to prevent a recurrence of the proliferation of database structures and systems that presently exists in the organization's corporate applications.

- It is important that IDRC begin using its data as a resource, particularly for managing. Because data is in different formats and not easily available for reporting, IDRC should develop a data warehouse which contains key information from the various corporate databases in a structure which can easily be queried. The initial data should be from Radius, HiFi and Hurmis. This would provide users with a read-only data base for reporting as well as providing MIS with an opportunity to test some of the elements of its client server strategy.

F3. Longer Term Requirements

- IDRC should think or replacing most of its corporate systems within the foreseeable future. In addition to the client/server strategy, IDRC should develop a procurement strategy for systems, weighing carefully the pros and cons of buying integrated systems vs. best of breed systems. The replacement of the corporate systems is necessary, but it will be a relatively costly process which will take several years to implement.

H. Conclusions

IDRC has a fairly complete suite of corporate systems and office automation software, however, many of the systems are beginning to show their age. Because many of the systems are in different database formats, data sharing between the systems is difficult. This inability to share data reduces considerably the usefulness of the data in the individual systems. Most of the main corporate systems, with the exception of the project management/monitoring application Radius, are operational.

In the short run, it is essential that IDRC get the Radius system operational. This will involve a major effort to 1) correct and update the data in the system, 2) incorporate new fields necessary for proper management, 3) review the business rules for project management, 4) complete two incomplete modules, 5) train users to run ad hoc reports on the system and 5) development of management and exception reports for the system.

In the longer run, IDRC will want to convert its corporate systems into more modern technology. Before embarking on this it should develop a long term client/server strategy as well as a policy on software selection--a policy which examines the corporate needs for integrated systems.

John Gordon
Grand River Informatics Inc.
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